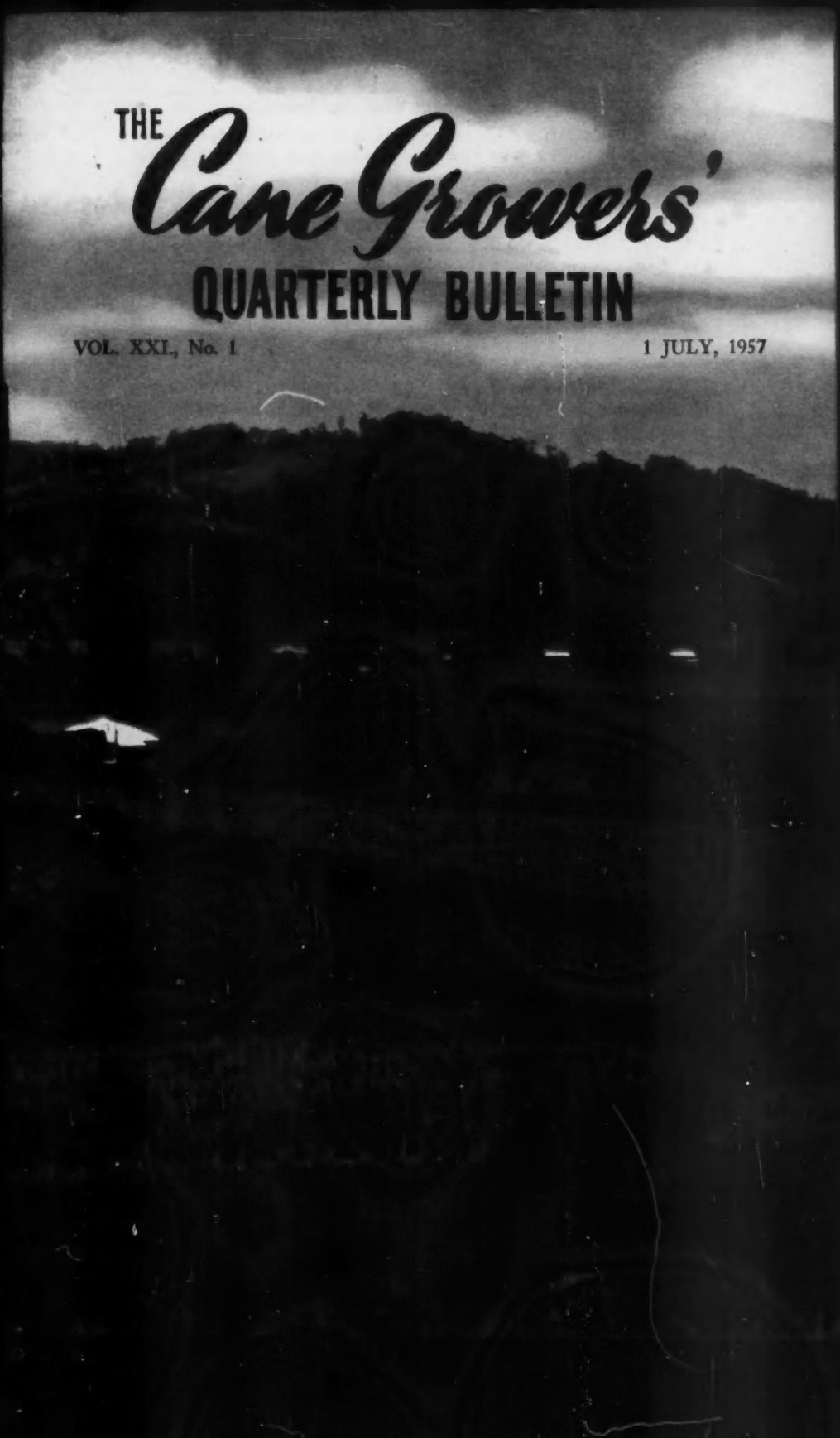

THE Cane Growers' QUARTERLY BULLETIN

VOL. XXI., No. 1 1 JULY, 1957

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BUREAU OF SUGAR EXPERIMENT STATIONS
BRISBANE

THE CANE GROWERS' QUARTERLY BULLETIN

ISSUED BY DIRECTION OF THE
SUGAR EXPERIMENT STATIONS
BOARD

1 JULY, 1957

Wholly set up and printed in Australia by
WATSON, FERGUSON AND COMPANY
Brisbane, Q.

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This Bulletin is an official publication of the extension service of the Bureau of Sugar Experiment Stations, issued and forwarded by the Bureau to all cane growers in Queensland.

The Cane Growers' Quarterly Bulletin

VOL. XXI. 1 JULY, 1957 No. 1

The Sugar Industry in this Technical Age*

By Norman J. King

Some publicity was given recently to a survey conducted by the National Science Foundation of America into research expenditure by co-operative organizations. My reason for commenting on this survey is that of the 531 organizations whose research expenditure was examined, the Hawaiian sugar industry was the largest spender, its research cost being $1,700,000. Now, Hawaii has a sugar production which is comparable in magnitude with that of Queensland; in fact, our output is somewhat larger. Both industries pride themselves somewhat on their technical efficiency, and the point of interest lies in how our research expenditure compares with Hawaii's. But rather than confuse the issue by relating our expenditure in pounds to theirs in dollars and ignoring relative costs of wages and materials in the two countries it is perhaps more realistic to show what percentage of the gross value of sugar produced is spent on research and investigation. In Hawaii the figure is 1.13 per cent. and in Queensland it amounts to 0.55 per cent.—a little less than half.

The value of the raw sugar produced each year in Queensland is approximately fifty million pounds so that even the 0.55 per cent. mentioned amounts to the sizable sum of £275,000. Few people within the industry, and even fewer without, are aware of such expenditure on agricultural and manufacturing research in one industry in this State, and even a smaller number appreciate that about 97 per cent. of the money used is contributed by the growers of sugar cane and the manufacturers of sugar. It is very doubtful whether any other agricultural industry in Australia can claim so little dependence on Government monies for its research activities.

As far back as 1900 when the Queensland sugar industry was but a struggling infant the Bureau of Sugar Experiment Stations was established by Act of Parliament. At that time and for many years afterwards the amount which the industry contributed in levies was matched equally by the State Government. As the years progressed, and the industry sought a greater say in the control of the Bureau, the Government limited its contribution and this subsidy is now fixed at £7,000 a year, and this is the only financial assistance from non-industry quarters.

* A national broadcast over the ABC.

It is under the Sugar Experiment Stations Acts that the various disease and pest control boards are constituted, and these again draw their funds entirely by levy on cane growers and millers. Some six or seven years ago a new research organization was created—purely for manufacturing research—and this is financed by the sugar millers only. Its aim is to advance engineering and chemical technology in the factories which manufacture sugar from the raw material—sugar cane. Finally, the Colonial Sugar Refining Company finances its own investigational activities in the agricultural field, the results of such work being made available to the canegrowers of the State as a whole. This is, by no means, a complete summary of industry research. Several proprietary milling companies spend appreciable sums to improve technical efficiency in their own organizations.

In common with other industries throughout the world there is an increasing tempo in the research field. Primary producers and processors alike are more conscious of the dividends accruing from expenditure on scientific research and have a greater awareness of the need to augment this form of investment. Also, as in other industries, the principal limitation is imposed today by the lack of trained technical personnel.

Despite the many reforms and advances which have resulted from the research institutions in the sugar industry, one is occasionally asked to justify the expenditure on a research programme. Such queries emanate from outside the sugar industry and are based on the naive assumption that, since we produce more sugar than Australia requires, there is no need to seek higher standards of efficiency. Such an assumption ignores several important facts. Firstly, there is probably no more competitive market in the world than the sugar market. Our costs must be kept low if the industry is to survive and it is more difficult for us to keep costs down than it is for most other sugar producing countries, because ours is a white-labour, high-wage industry.

Further, although we have a limited quota on the export sugar market it earns some £25,000,000 each year, and this is a valuable addition to Australia's overseas credits. The sugar growers and manufacturers are large employers of labour and purchasers of goods and any increase in the tonnage of sugar produced is reflected in an improvement in this country's internal economy. Finally, the highest degree of efficiency attainable is essential to ensure Australia's independence of overseas sugar supplies during periods of world conflict.

The value of research is perhaps best gauged by the successes achieved and the contributions made by the research organizations to industry economy. During the past twenty years alone the progress directly attributable to research has been notable. The industry's two major insect pests have been effectively and completely controlled; our three most serious cane diseases have been eradicated; our pathologists discovered and established a control system for a previously unknown and unrecognised virus disease which has since been found to exist undetected in all sugar producing countries of the world; our sugar-cane breeding has been so successful that locally bred varieties have supplanted imported ones and now constitute well over 80 per cent. of our production; and soil and fertility surveys with a concurrent plant nutrient research programme have changed haphazard fertilizing to an intelligent and scientifically controlled system. Of these many contributions to industry economy it is conservatively estimated that the elimination of losses caused by one of the insect pests—the cane grub—saves the sugar industry £250,000 each year.

I made mention of the discovery in Queensland of a previously unrecognised virus disease. This almost symptomless complaint causes serious stunting of the crop. Because of the lack of easily detected symptoms it was not known until recent years that such a disease existed. In the short space of four or five years the same disease was found to exist in practically all other sugar growing countries and today most sugar industries are engaged in implementing control measures which were devised in Queensland.

The losses in our cane varieties have been measured and they amount to some ten per cent. on the average. Relate this figure to a £50,000,000 industry and the monetary gain from the discovery and control of the disease becomes a surprisingly large figure. On the basis of these two examples alone the Queensland sugar industry is reaping dividends from its research investment which should be the envy of other primary industries.

One speculates from time to time on what the future holds. Is it possible to continue indefinitely to show advances of similar magnitude and value? Maybe not. Each step forward raises the standard of efficiency and it becomes increasingly more difficult to improve on the new standards. We know there are still many problems to solve; more diseases which are exacting their toll of crops to be conquered. There is a constant stream of fascinating new chemicals in this technical age which are opening the door wider to the solution of many problems. Chemical weed control is in its infancy, systemic insecticides are gradually being developed to protect plants from within against insect attack. Antibiotics have already met with some success in disease control in the plant world, and radio-active tracer elements are clearing up a lot of misconceptions in plant nutrition. With all the new tools becoming available to the agricultural scientist, and the rapidity with which new ideas and techniques are replacing the old, one would be foolhardy to predict future trends.

In our Queensland sugar industry there are many opportunities for technical advancement. There are several minor pests which are active enemies of crop development. There are still some root-eating grubs which possess high tolerance to most modern insecticides; funnel ants are a problem on restricted acreages; the losses caused by nematodes are still not clear; and there is evidence that the soil microfauna complex is playing some part in reducing production. We still have some serious cane diseases, the mode of spread of which is not understood; efforts are being stepped up to improve the genetical make-up of our cane varieties both in respect of sugar content and vigour; weed control in the wet belt, where annual rains are over 150 inches, is a serious but not insoluble problem; and better fertilizing will follow a clearer understanding of sugar cane nutrition. There is room for improvement, too, on the manufacturing side, and the day is not too far distant when better and more profitable use will be made of factory by-products.

We are living in an age of technology. Efficiency in production, whether it be primary or secondary, is becoming more and more dependent upon fundamental research and its application to industry problems. Australia has learnt in recent years that any failure to maintain the highest possible standards of efficiency can result in pricing its products out of overseas markets. The economy of sugar producers is largely dependent on overseas sales and they are ensuring, by their financing of research, that their efficiency is maintained at a high level and that their costs are as low as social conditions will allow.

"Bacterial Mottle"—A New Disease of Sugar Cane in Queensland

By D. R. L. STEINDL

During the past ten years or so officers of the Colonial Sugar Refining Company have reported minor outbreaks of an apparently new dsiease of sugar cane in badly drained fields in the Herbert River area. The name "root disease" had been given to the disease by the Company pathologists owing to the poor development of the rooting system of diseased plants. However, there has been no record of any specific organism being associated with, or causing, this disease.

Within the past two years Bureau officers have found the disease at Giru and in the Mackay district, and inspections have been made in likely localities in other districts, but to date it has not been found outside the three districts mentioned. The occurrence of the disease in several areas suggests that it could become of economic importance in certain localities, and was the reason for commencing this investigation into its cause and method of transmission.

Early symptoms of the disease consist of creamy white, regular stripes, one to two millimeters wide, extending from the base or near the base of the leaf blade, upwards parallel with the vascular bundles. One to many may occur on each leaf; sometimes they extend the full length of the leaf, but more often cease at irregular intervals along the leaf. Orange to rusty-red areas develop later, and eventually the greater portion of the stripes becomes involved. At this stage the symptoms closely resemble those of downy mil-

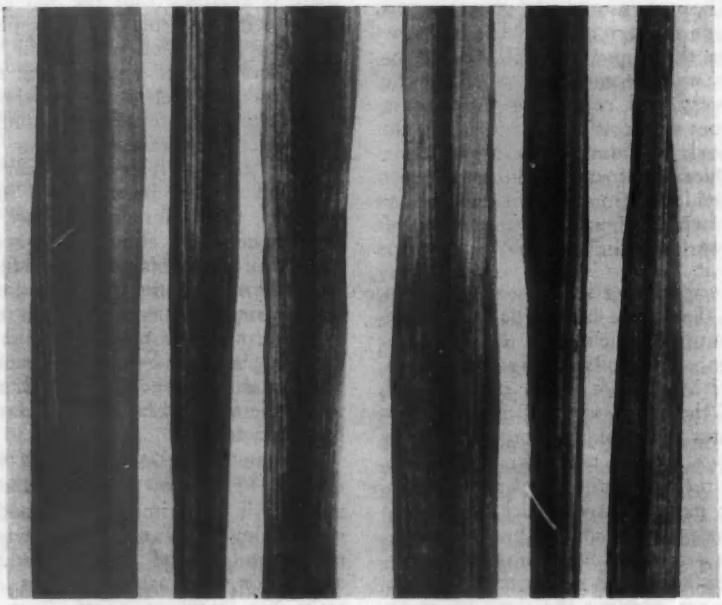


Fig. 1—Young streaks and mottle of bacterial mottle in leaves of Trojan.

dew at a fairly well advanced stage of development. As the disease progresses the infection becomes systemic, growth of the infected shoots slows down and the young leaves develop an irregular mottling of chlorotic and green areas, frequently without the distinct stripes. As these leaves age, numerous small rusty-red flecks and short narrow stripes appear; later the tips and edges wither, the leaves curl inwards and the whole shoot eventually dies. Diseased stalks often produce numerous side shoots at the base, and standover cane has been observed

Fig. 2—Stool of Trojan affected with bacterial mottle, Abergowrie, Herbert River.

to produce a "witches broom" effect several feet above ground level. These side shoots also show the characteristic mottling and rusty appearance on the leaves.

Small brown areas of dead tissue occur within severely diseased stems, particularly in the region of the nodes and the growing point. On occasions they break down to form small cavities which may contain droplets of a gummy substance.

Whole stools may become diseased, but sometimes only a portion of a stool is affected, and this part will eventually die out leaving the remainder of the stool apparently healthy. If a diseased stool is transplanted, or if diseased setts are planted, they will produce only small sickly shoots which die out after a few weeks' growth.

Microscopic examinations of diseased plants reveal immense numbers of bacteria within the tissues of the leaves and stems, and a bacterium has been readily isolated in pure culture from a large number of diseased specimens. Inoculation experiments with suspensions of this bacterium into setts and young shoots of Q.57 and

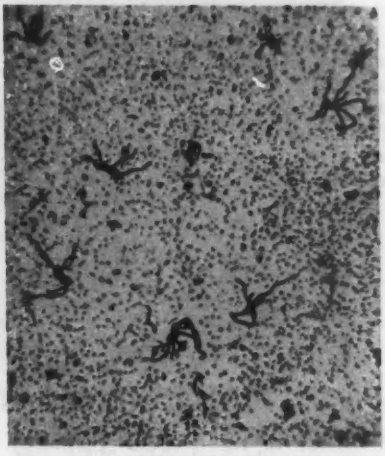


Fig. 3—The bacterium responsible for the disease, stained and photographed under high magnification.

Trojan have readily reproduced symptoms of the disease, and the bacterium has been consistently reisolated from these artificially infected plants. These transmission experiments are considered to provide proof that this bacterium is the cause of the disease. The bacterium concerned has not yet been identified, but it is a rod-shaped organism with a number of flagella, and possesses many characteristics of the *Erwinia* group. Cul-

tures have been forwarded to the Commonwealth Mycological Institute for identification.

Transmission of the disease in the field is usually not rapid, but the disease is very destructive when plants do become infected. It usually occurs in low-lying areas, and its spread appears to be associated with flooding; it frequently appears in ratoon crops which have been flooded as plant cane. It is quite probable that the bacterium is carried by flood waters and if it happens to lodge in the spindle of a young shoot, in buds at the base of a stool or in a wound, it may be able to set up an infection.

The varieties Q.57 and Trojan seem to be the most susceptible of those varieties grown where the disease occurs, but it has also been found in Badila, Comus, Eros and Q.45.

More Giant Sensitive Plant

Giant sensitive plant keeps cropping up in new locations. Since our last issue the pest has been found in the Ingham area and in the Farleigh, Proserpine and Plane Creek districts. In each occurrence the giant sensitive plant has been introduced with Centro seed. Centro is a perennial legume suited to tropical areas, and our seed supplies are coming from certain overseas countries where giant sensitive plant exists. Canegrowers would be well advised not to plant Centro in their paddocks while there is any risk of it being adulterated with giant sensitive plant.

Miscellaneous Cane Diseases

Visitors to the Bureau Pathology Farm at Eight Mile Plains near Brisbane, are always interested in a couple of rows of assorted stools which the pathologists refer to under the collective title of "Miscellaneous Diseases". These include such well known diseases as dwarf and sclerophthora but, in addition, there are stools suffering from all sorts of abnormalities, some recognizable as possible diseases, others as genetical aberrations. There are stripes and freckles and sometimes spectacular blotches on the leaves, in one section the stalks grow in a long spiral instead of vertically, in another the effect is as though a hormone weedicide had been applied too heavily, in others the leaves have so altered that the variety is only recognizable by the stalk, and in others again there are no symptoms but the stools just obstinately refuse to make normal growth. Their very minor importance in commercial fields does not imply that the specimens in the miscellany are devoid of interest to the pathologists and a Technical Communication on them is in course of preparation.

New Glasshouse at Meringa

By J. H. BUZACOTT

Following the destruction of the glasshouse at the Northern Experiment Station by the 1956 cyclone, an order was placed for a British built prefabricated glasshouse. This was duly received from England in February, 1957, by which time the concrete foundations and side walls were completed by a local contractor.

The aluminium alloy framework was erected by the staff of the Sugar Experiment Station and glazing subsequently by contract. As a result the glasshouse was completed ready for service by the 9th May, 1957.

The new glasshouse is 45 feet long by 28 feet 6 inches wide and is 13 feet 6 inches high, with a floor space of 1,200 square feet. This is 200 square feet larger than the old glasshouse. It has a partition 18 feet from one end and the smaller section will be electrically heated. The heating installation will be similar to that used in the old glasshouse and consists of twelve one kilowatt rod elements with a switching gear thermostatically controlled.

The erection of the "Duralumin" framework provided something of a jig-saw puzzle as there were over 700 individual pieces in it, and although a building plan was received from the manufacturers, few of the parts were numbered and this led to some confusion. The framework consists of five sections and after the first section was completed the remainder proved relatively easy and all parts were eventually found to fit perfectly.

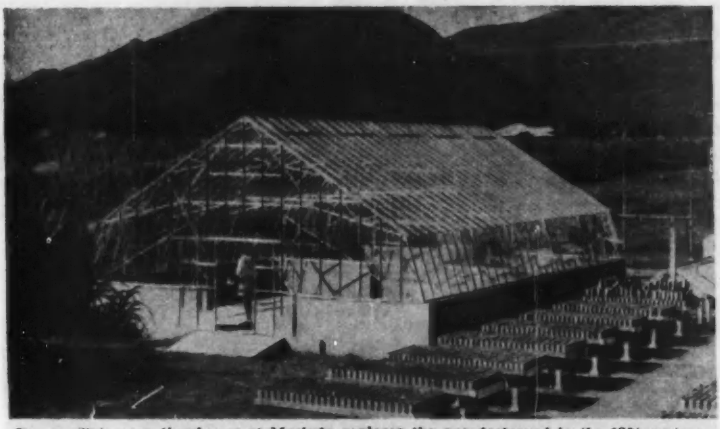


Fig. 4—This new glasshouse at Meringa replaces the one destroyed in the 1956 cyclone.

The side walls and foundation contain 1,120 cubic feet of concrete, in which 12 tons of cement were used. The 700 odd pieces of the framework are held together with almost 3,000 "Duralumin" screws, bolts and nuts. It took two men twelve days to glaze the house and 1,028 sheets of agricultural glass were used. There are 20 side ventilators and 20 ventilators in the roof, all of which are operated by remote control from the ends of the building. In addition there are 80 portholes in the concrete walls for further ventilation, and these are arranged in batches of four with a hinged cover to each group.

Water Carriers

By H. G. KNUST

The publication of an article in the January issue of *The Cane Growers' Quarterly Bulletin* dealing with water transportation in polyvinyl chloride tubing evidently provoked thought among cane growers in the Bundaberg district, and by the end of March some growers were using polythene tubing of Australian manufacture for transmission purposes.

The tubing can be obtained in diameter ranges varying from 7½ in. to 15 in., while thickness of material varies from 0.006 in. to 0.010 in.

The writer viewed 7½ in. diameter 0.006 in. tubing in use on a South Kalkie farm (Fig. 5) and noted that it satisfactorily handled 18,000 gallons of water only seven rows of cane at a carrier drain about 3 feet wide and 15 in. deep.

The grower concerned experienced a worthwhile saving of water by the method, compared with the open carrier drain. He found that he could water only seven rows of cane at a time from the open carrier drain while he was able to water twelve rows at a time with the same volume of water delivered by the pump and transported to the field through polythene fluming.

The economics of this method have not been determined simply because insufficient time has elapsed since its introduction, but its mobility is beyond question, no carrier drains have to be established (Fig. 6), and the weed problem in the carrier drain is eliminated.

To date, this fluming is being used for transmission purposes only, no known attempt has been made to use it for distribution purposes; it is attached to the pump discharge by slipping it over the piping and tying it or holding it with a rubber band; couplings have not been made for join-

Fig. 5—Fluming on the right of the photograph is 7½ inch diameter polythene tubing.

Fig. 6—The polythene tubing snaking along a headland and carrying some 18,000 gallons of water per hour.

ing lengths of fluming but this could be done by using short lengths of galvanized iron fluming and attaching the polythene fluming in a manner similar to that used at the pump discharge. The local distributor recommends the use of sawdust for sealing small punctures, or the use of waterproof adhesive tape.

Although the fluming is light to handle when setting out, much care will have to be exercised when it is being picked up because of the tendency to hold water even though it appears to be empty.

The Queensland agents, Queensland Can Co. Ltd., of Brisbane, state that 100 yards of the 10 inch plastic fluming would weigh 20 lb., and the same length of 12 inch fluming would weigh 29½ lb.

It should be noted that, whereas the polyvinyl chloride tubing described in the *Quarterly Bulletin* for January, 1957, was given a three-year guarantee by the manufacturers, there is no guaranteed or known life for this polythene tubing which is being used in Bundaberg.

Ratooning of Drought-Stricken Crops

Current drought and frost conditions in the southern area will necessitate a decision by many growers whether to plough-out and replant immediately, or attempt some method of ratooning.

Fortunately, the 1946 season provided much information in this regard. Affected growers are therefore advised to contact their local Bureau centre and avail themselves of information which is available, remembering that in 1946, in one mill area alone, 650 acres were hurriedly and expensively ploughed out and replanted.

The October, 1947, issue of the *Cane Growers' Quarterly Bulletin* contained two articles on ratooning of drought-stricken crops, and methods of dealing with dead cane crops. Should the 1957 drought continue, and should growers be faced with similar problems to those which arose in 1946, they would be well advised to study the procedures adopted at that time.

N. McD. S.

Cane Growers Honour Bureau

On April 6th, at Meringa Sugar Experiment Station, the cane growers of Queensland marked their appreciation of the Bureau's work in gaining victory over the cane grub pest. Mr. Ben Foley, Chairman of the Queensland Cane Growers' Council, presented to the Bureau a bronze plaque to record the event, and the presentation was received and acknowledged by Mr. A. F. Bell, Deputy Chairman of the Sugar Experiment Stations Board.

It was a happy circumstance that, on the occasion of the presentation, the Right Hon. the Prime Minister (Mr. R. G. Menzies), who was visiting Cairns to open the Annual Conference of the Queensland Cane Growers' Association, was able to attend. He was accompanied by Senators Ben Courtice, Ian Wood and E. B. Maher.

Delegates to the Annual Conference, from all districts in Queensland, attended the function. Mr. Foley, in making the presentation, said:—

"The cane growers' organization has long realised the value of scientific research into the problems associated with primary industries, and growers have always sought and been ready and willing to accept the sound, valuable advice made available to them by the Bureau officers toward the solution of the many problems with which the grower is confronted.

"The cane grower has always been alive to the necessity for safeguarding his position against the constant spiral of increasing costs. He has greatly appreciated the very valuable contribution made by the Bureau toward that objective in the following aspects of his farming business, viz.: (1) Employment of special purpose implements in the field; (2) development of better method of cultivation; (3) breeding of higher yielding varieties; (4) the more rational use of fertilizer; (5) the higher standards attained in pest and disease control.

"The Cane Growers' Council has always recognised and acknowledged this, and in a practical manner has

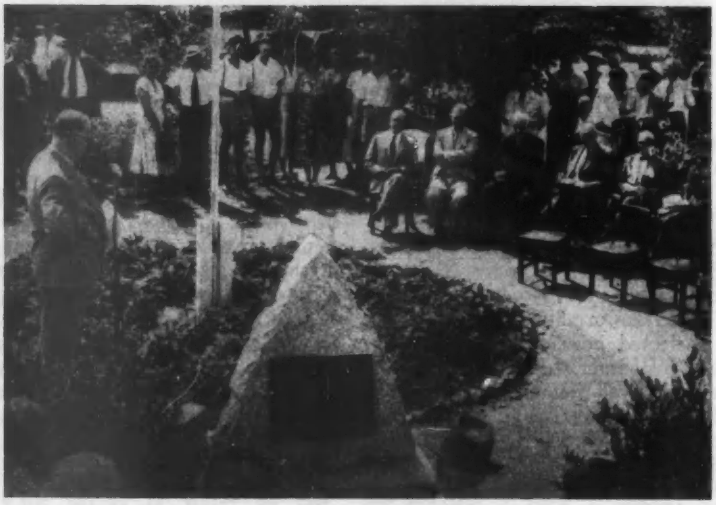


Fig. 7—Chairman of the Cane Growers' Council, Mr. Ben Foley, addressing the gathering on the occasion of the presentation.

now demonstrated its appreciation by the presentation of this bronze plaque to the Bureau.

"The effective control, within the last decade, of the destructive cane grub in North Queensland was one of the most outstanding achievements of the Bureau's activities, and was so spectacularly successful that its results prompted a decision by the Council to commemorate the achievement by the presentation of this plaque, which has been erected on a granite slab obtained from the nearby hill. This northern station, Meringa, was selected for the erection of the plaque because it was in this locality that the research and experimental work were carried out and the effectiveness of benzene hexachloride demonstrated.

"As most northern growers know, the grub pest had reached alarming proportions and had reduced farming on those highly fertile lands, some of the best land in Queensland, to very unprofitable levels; in fact, had made it practically impossible to continue growing cane thereon, because the results were too risky. Crops ready to harvest would be almost completely devastated, necessitating a plough-out instead of harvesting the crops.

"During the Bureau's experiments various applications to the soil, of lime, salt, potash, naphthalene, arsenic, Paris green potassium cyanide and many other chemicals were tried with little beneficial result.

"The Bureau was constantly in touch with overseas development in this field and in the early 1890's in reply to the Queensland Department of Agriculture further inquiries overseas, it was suggested that carbon disulphide, injected into the soil, would prove effective.

"This fumigant was tried, but its cost on a large scale was almost prohibitive. It was, however, used to some extent, because there was nothing else so effective and farmers were becoming desperate. Up to 2,000 acres were treated annually.

"In 1895, payment for the collection of grubs and beetles was introduced due to the pressure by growers for some more effective method of control, but despite the fact that large sums of money were expended annually considerable damage and enormous crop losses continued, and by 1912 it was estimated that the annual loss to the industry caused by grubs approximated £100,000.

"Since, by the early 1900's, there appeared to be little or no abatement of the trouble, the consequent demand by the growers led to the appointment of an entomologist to the Bureau in 1911 to make a complete biological study of the pest, with his headquarters at Gordonvale. From there on all aspects of control were investigated.

"You will remember that beetle feeding trees were destroyed at considerable cost, attractants and repellants were used, and yielded nothing of value.

"The now 'infamous' giant toad from America was then introduced in 1935, but did not achieve the success claimed for it against similar pests in other countries.

"The established policy of the Bureau was to thoroughly test all new promising insecticides and in normal procedure BHC and DDT came up for testing in 1945, and in the trial plots the BHC was conspicuously successful. It then became necessary by experimentation to determine the correct treatment rates of application. The results were outstanding and won instant appeal.

"The cost was not unduly high and in a few years the demand for this insecticide exceeded the supply, and it was not until the end of 1949 that the industry's requirements were fully satisfied.

"In the years 1952-54 approximately 60,000 acres were annually treated, but during the past few years this total has receded to some 38,000 acres, due largely to a decline in grub populations and to the fact that less area is

now infested, following the systematic use of the BHC, more familiarly known as gammexane.

"This wonderful result for which the entomological staff of the Bureau has been responsible, has been the means of saving large crops of cane in North Queensland worth several hundred thousand pounds annually and must be a cause for considerable satisfaction and gratification to the Bureau scientists, as well as to the growers concerned, who, I know, appreciate to the fullest possible extent the very valuable service, in so many fields, rendered to the industry by the Bureau of Sugar Experiment Stations.

"It is now my great pleasure and privilege to present to the Bureau of Sugar Experiment Stations on behalf of the Queensland Cane Growers' Association this bronze plaque in recognition of one of the most outstanding of its many notable achievements.

"The control of the cane grub which this plaque commemorates, highlights the fact that the Bureau has proved a tower of strength in overcoming many of the problems and adversities which beset the industry from time to time. Long may it continue to function and may similar successes attend the future untiring efforts of the Director and his staff".

The inscription reads:—

"This plaque was presented by the Queensland Cane Growers' Council in recognition of the major service performed by the Bureau of Sugar Experiment Stations to the cane growers of Queensland in initiating and carrying to fruition the research which led to the successful control of the cane grub, the industry's worst pest".

In acknowledging the plaque on behalf of the Sugar Experiment Stations Board and the Bureau, Mr. A. F. Bell made the following comments:—

"On behalf of the Sugar Experiment Stations Board I wish to thank you, Mr. Foley, for your generous references to the staff and work of the Stations. And through you may I convey to the Queensland cane growers our deep appreciation of their motives in presenting this commemorative tablet.

"We are very proud to accept it for it not only commemorates a technological achievement of great importance, but it also proclaims the high standards of understanding and co-operation which characterise the relations of the sugar industry and its scientific services.

"Even in these enlightened days the average citizen is prone to regard scientists as long-haired, short-sighted oddities; broad of brow but narrow of vision; unpractical, humourless and, at best, harmless.

"Fortunately, Queensland sugar men have never had this somewhat myopic view. On the contrary, they very early realised that maximum progress could come only from the close integration of science and industry. As long as 70 years ago leaders of the sugar industry were pressing the young Queensland Government to set up a scientific service for mill and field.

"Moreover, they offered to share the cost with the Government; they were obviously men ahead of their time!

"This early attitude of the industry to science has persisted. Cane growers and millers will this year provide about £175,000 for the conduct of the Sugar Experiment Stations. This is a considerable sum but it is obviously a sound investment. The control of the cane grub pest, commemorated by this tablet, annually saves three or four times this amount.

"The development of the variety Q.50 in the central districts, and the eradication of gumming, downy mildew, and Fiji diseases in the southern districts—to quote but two examples—also return the cost of the scientific services several times each year.

"We are very pleased to have with us today Messrs. Rutledge and Wilson, representing Imperial Chemical Industries. It is very appropriate that they should be here. Commercial BHC, the insecticide used in the control of cane grubs, is a product of the I.C.I. laboratories, and we were very generously treated by them when very small quantities of this chemical first became available in 1945.

"Our initial experiment was most promising, and in 1946 I.C.I. gave us as much BHC (or "Gammexane" as it was then called) as they possibly could for widespread field trials.

"Many years of patient research work had gone before and this enabled the very rapid exploitation of the new method of control, the practical results of which are well known to you all.

"There remain other, and pressing technical problems. More will arise from time to time. But if we work together in the future as we have in the past, we will surely surmount them one by one.

"May I conclude by repeating that we are very proud to accept this tribute".

At this juncture the Right Hon. the Prime Minister addressed the gathering briefly in the following terms:—

"People talk a great deal of increased primary production today, but not many realise just how much of it is due to the devoted and single-minded work of the scientists.

"These men love their work, they are not enormously well paid, and they develop the most astonishing skills. Their work has meant the difference between bankruptcy for the industry and prosperity.

"This State bears witness to the labours of the little cactoblastis. Likewise, myxamatosis has added at least £50 million to the value of the production of wool. It simply shows what vast dividends we get from research.

"The old reluctance in some industries to think much of the scientists has completely disappeared. You in the sugar industry have plainly realised the connection between scientific research and work in the field, and a very happy marriage it has been".

"One of my earliest recollections in the wheat country of Victoria was of the scientific men who came around and talked about superphosphates. They were listened to with complete scepticism. At that time it was very difficult to get people in the great rural industries to believe that scientific research was of the essence.

"This plaque here today is a tangible reminder of the work done inside this station, whose results can be seen so abundantly outside the gate".

Fig. 8—The Rt. Hon. the Prime Minister (Mr. R. G. Menzies) demonstrates the use of a cane knife on Meringa Sugar Experiment Station.

On behalf of the Bureau Staff, Mr. J. H. Buzacott, Senior Plant Breeder (but previously Entomologist at Meringa Experiment Station) who was largely responsible for the cane-grub control work, spoke on some of the historical aspects of the greyback grub and its ultimate control. Mr. Buzacott said:—

"For me, possibly more than for anyone else present, the presentation of this plaque today has a special significance. This station was established here on this site in 1917, forty years ago, as a centre of research for the control of the cane grub. For more than three-quarters of the period of its existence I have been working here, and for more than twenty years devoted my time specifically to pest control with, as a major objective, the control of the cane grub. I can truly say that I was here in the horse and buggy days, as also can Mr. Mungomery and Mr. Bates, both of whom are here today, for the only means we had of transport when I first came here were two horses, a sulky, a buggy and a bicycle. Thanks to a sympathetic Board we are now well equipped both for transport and with apparatus to carry out our research work in the many phases of sugar cane culture which we now investigate here.

"Prior to the establishment of this station entomological investigations were carried out in Gordonvale for some six years. Investigations initiated by the earlier workers, and carried on until the discovery of benzene hexachloride, followed every known channel of pest control. Soil fumigation, the use of poisons, both in the soil and on feeding trees, the destruction of feeding trees, light trapping, and even the introduction of parasites and predators were all tried. Poisoning the foliage of feeding trees was unsuccessful because they were dispersed over too wide an area through forest and rain forest; destruction of feeding trees only brought about a wider distribution of the pest; parasites and predators could not cope with the enormous hordes of grubs that developed in the excellent conditions for survival provided by the cane fields. Soil fumigation with carbon bisulphide or with a mixture of carbon bisulphide and paradichlorbenzene was the only palliative, and the use of the former was suggested as early as 1890. Soil fumigation, however, was an arduous task which had to be performed during the hottest and wettest time of the year. It had to be timed accurately, and both the material and the labour for its application were costly. Even though the use of carbon bisulphide was subsidised by Cane Pest Control Boards the largest area treated in any one year with this chemical never exceeded 2,000 acres.

"And so the scene opened up on the second world war with the entomological staff desperately trying to find efficient mechanical means for the injection of carbon bisulphide, searching for cheaper and less dangerous substitutes for it, and trying to develop fumigants which would have longer lasting effects in the soil.

"At this time a new pesticide came into prominence overseas. This was the substance DDT which had opened up a new era in pest control, but unfortunately at that time all supplies of it were diverted to the war effort. It was not until late in 1945 that we received our first experimental lot of DDT and with it came also a small sample of another pesticide designated only by a number "666". This was developed in England to replace shortages of other insecticides such as derris, the sources of which had become cut off by the war.

"These two chemicals, received together, were immediately used to treat small field plots here on this station in

[*continued on page* 21

Fig. 9—The Rt. Hon. the Prime Minister (Mr. R. G. Menzies) speaks to the gathering on the value of science to agriculture.

Fig. 10—The plaque which was presented by the canegrowers of Queensland attached to a granite boulder from Behana Creek, and set up in the Meringa Experiment Station grounds.

Fig. 11—Mr. Ben Foley (Chairman of the Queensland Canegrowers' Council) presents the plaque to Mr. A. F. Bell (Deputy Chairman of the Sugar Experiment Stations Board).

Fig. 12—The Prime Minister (Mr. R. G. Menzies), Mr. N. J. King and Mr. A. F. Bell discover some cause for mirth in a field of cane.

Fig. 13—Mr. J. H. Buzacott addressing the gathering on some historical aspects of the grub control work.

Fig. 14—On Meringa Experiment Station. In the picture are Mr. N. J. King, Mr. G. Wilson (partly hidden), Mr. R. G. Menzies, Senator Maher, Mr. Dash, Mr. A. F. Bell, Senator Wood and Mr. J. H. Buzacott.

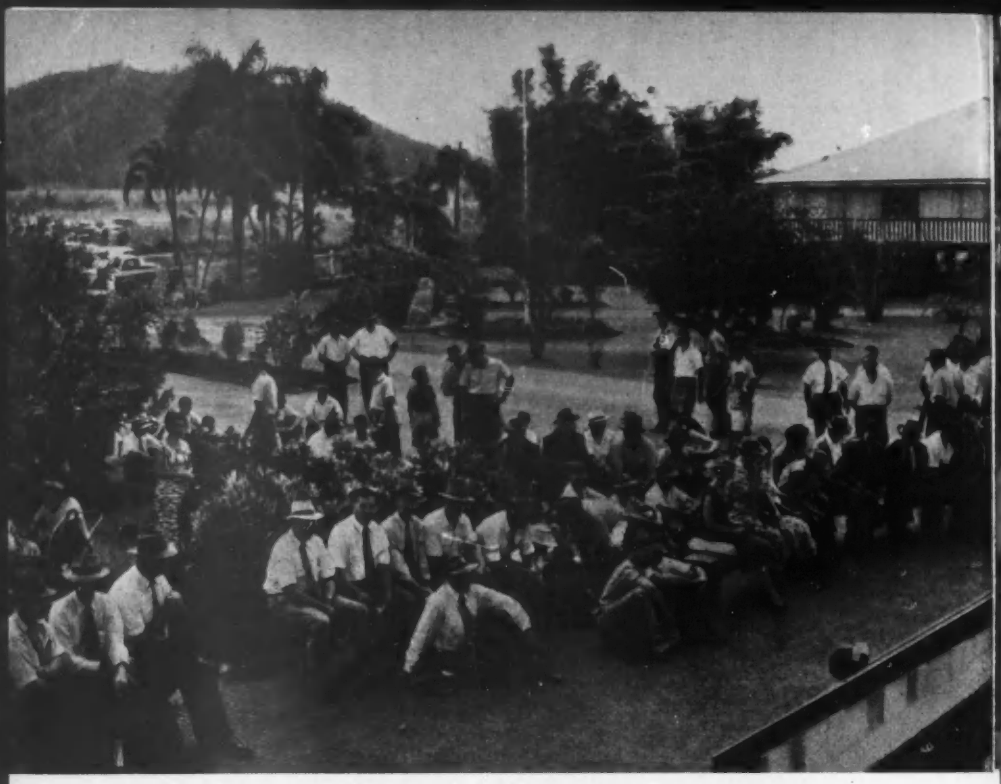
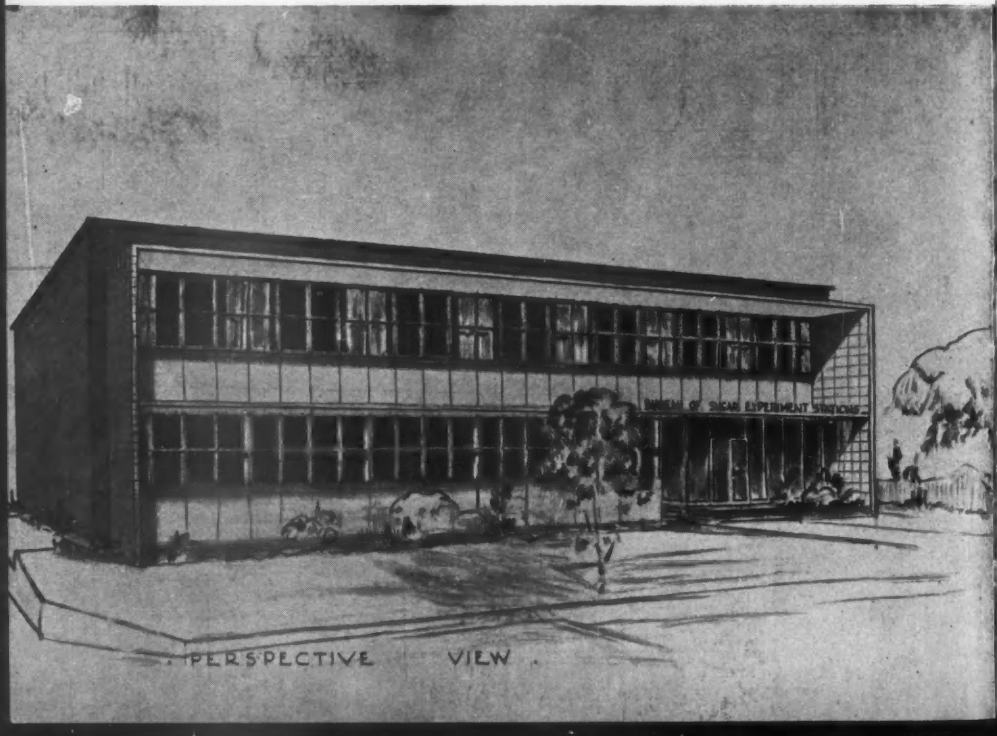


Fig. 15—Meringa Field Day, May 8th, 1957. Portion of the crowd listening to addresses.

Fig. 16—Architect's sketch of the front wing of the new Head Office building in Brisbane. The rear wing is not visible.



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the expectation that they would become grub-infested in 1946. In addition, they were tested to the extent of available supplies against the beetle stage of the grub during the Christmas period of 1945. Results of the tests against the beetles showed that DDT was no more effective as a means of control than many other chemicals tried previously. On the other hand "666" was more effective than any other chemical ever used. This was the substance soon to attain fame under the trade name of "Gammexane" and, as more companies undertook its manufacture, it later became known by its chemical name of benzene hexachloride—now usually contracted to BHC. In addition to being effective as a beetle poison when sprayed on the foliage of breeding trees, concentrations as low as one part of the active material in two million of soil effectively killed beetles which passed through the soil.

"Accordingly, the results from the small field plots were looked forward to with great hope. In due course the plots became grub-infested and it is now history that in the plots treated with BHC the cane remained green and healthy, whilst the cane in control plots, and in plots treated with DDT, succumbed to grub attack.

"The promise of the early trials was so great that the Bureau then threw all its resources into the intensive testing of BHC so that if it lived up to its promise it could be made available to the farmers in the shortest possible time. Since the small entomological staff could not be expected to provide all the necessary information within a short period the service of other Bureau officers was co-opted. During 1946, in addition to trials laid out in Gordonvale by the entomological staff, other trials were established by our Field Officers in Innisfail and Mossman in order to extend the range of our knowledge of the insecticide's action over a greater variety of soils and weather conditions. Our pathologists tested the chemical for any deleterious effect on useful bacteria and fungi in the soil, and even at the highest level our Director and his assistants made the necessary approaches to ensure that the Queensland sugar industry would obtain an allotment of the inadequate supplies of BHC which were available at that time.

"So successful were the combined efforts of the staff that it was possible during 1947 to give the green light to the industry for the commercial application of BHC for the control of grubs. This was less than two years after the first small experimental sample was received. In 1947 3,000 acres were treated commercially for the 1948 harvest; the area treated increased to 11,200 acres in 1948, and the following year 32,000 acres were protected. Finally the peak of 61,300 acres was reached in 1953. In effective grub control BHC succeeded beyond our greatest hopes. Where initially it was hoped, at most, to protect the plant crop it was found that a single application of 150 lb. of 10 per cent. BHC, which represents less than two pounds of the active material per acre, gave protection not only for one crop but for three. Apart from the low cost of less than 30/- per acre per year for material it has been possible to devise a variety of simple implements to apply BHC to the soil, and the long period over which it may be successfully applied renders it one of the simplest and most effective pest destroyers ever to come into use.

"And what of the financial losses due to the ravages of the cane grub! One cannot do better than quote from an article by Mr. N. J. King, published in the *Cane Growers' Quarterly Bulletin* for January, 1957. In that article he states that in 1946 it was estimated that 120,000 tons of cane were lost due to grub attack in Queensland. At present day prices this amount of cane would be worth £400,000. In the years since 1872,

when grub damage was first reported in Queensland, there must be many years when the damage approached that figure, and it is an undoubted fact that the value of sugar cane lost over the years amounts to many millions of pounds. And what of the other side of the question—the morale of the cane farmer! Only those with personal experience can know the hardship and worry which farmers in grub-infested areas suffered—farmers who, year after year, saw vigorous and healthy crops of sugar cane devastated and destroyed by grub attack. Two of the Four Great Freedoms are "freedom from fear" and "freedom from want". Surely BHC has helped to bring to reality for the North Queensland cane farmer these two maxims; for if he has not become wealthy he is, at least, free from want, and if he still has many of the worries which are invariably associated with cane farming he can at least live without the fear of bankruptcy and ruin which was the lot of many farmers a few years ago.

"Today we have proudly watched the handing over of a bronze plaque given by the Queensland Cane Growers' Council to commemorate the part this station has played in the control of the grub. The plaque is fastened to a solid granite rock blasted from the source of the Behana Creek water scheme. As this water scheme represents district progress, so therefore is this rock a symbol of progress. Grub control with BHC has stood the test of time but much still remains to be done. There are minor pests to control, still some diseases to abolish, and even more new varieties are required by the industry. Let us trust that all future work of this organisation, of which the control of the cane grub was only one phase, is based on as firm and solid a foundation as this plaque now rests."

Fig. 17—A stand of the new variety Q.66 at Abergowrie. The cane was planted in September, 1956, and photographed in April, 1957.

A Study of Low C.C.S. at Babinda*

By NORMAN J. KING

Introduction

The quality ratio of Queensland sugar cane—of which the industry was justifiably and pardonably proud until a few years ago—has developed a retrogressive trend which now causes concern in many quarters. During the last three years, 1954 to 1956, the quality of cane has been so low in the high rainfall belt that the economics of cane growing are being seriously examined in some areas. This paper is aimed at listing—and examining where possible—the factors contributing to the change in quality.

For the purposes of the examination the Babinda area has been selected. There were two reasons for this; it has probably been affected most adversely in recent years by the factors responsible for quality deterioration; and secondly, a specific request was received from that area for an investigation of the matter.

In considering the possible causes of a change in quality in the area the following were listed, and it is proposed to examine each separately and attempt to indicate those responsible for an alteration.

(1) Change in varietal status.
(2) Length of crushing season.
(3) Rainfall, cloudiness, etc.
(4) Cane deterioration after burning and cutting.
(5) Mechanisation of loading.
(6) Fertilizer usage.

Change in Varietal Status

In all areas of the State there has been a major varietal change since the war years; in some districts there are barely remnants of the previous canes. The newer varieties have replaced the old, presumably, because they produced more cane per acre, were more resistant to disease and to harsh conditions, and gave a better net return to the grower. In some cases they were claimed to be of better sugar content than their predecessors. In Babinda the variety census shows that between 1946 and 1956 the major happening in the varietal field was the replacement of much Badila by Pindar (from 1951 onwards) and the descent into obscurity of H.Q.426 which was previously favoured for early harvesting. There is little doubt that, in regard to this varietal change, growers were influence by the better early vigour of Pindar and by the larger crop per acre; it is doubtful though whether much thought was given to the relative sugar content of Badila and Pindar under Babinda conditions.

In the examination of c.c.s. figures at Babinda mill one cannot but be impressed by the fact that, from 1951 season (when Pindar represented only 2 per cent. of the crop) to 1955 (when it had risen to 48 per cent.), Pindar was below mill average every month of every season. During the same five years Badila's record was—

1951, above mill average 4 out of 6 months
1952, above mill average 7 out of 7 months
1953, above mill average 6 out of 6 months
1954, above mill average 6 out of 8 months
1955, above mill average 5 out of 7 months

One varietal change in Babinda has therefore been to replace an above average cane with a below average one on a sizable proportion of its mill area. This change must be listed as a factor responsible for a lowering c.c.s. standard in the area. For the five years being discussed Pindar showed an average of 0.39 units of c.c.s. below mill average and Badila an average of

*A paper presented to the Conference of The Queensland Society of Sugar Cane Technologists.

0.17 above mill average. This difference of 0.56 units approximates to a value of 4/- per ton of cane.

Pindar's relatively low c.c.s. record is not peculiar to the Babinda area. Figures taken from the "Innisfail Canegrower" show that in 1955 and 1956 seasons Pindar was well below mill average at both Goondi and Mourilyan where it represented between 57 and 70 per cent. of the respective crops. For these two years at Goondi, Pindar averaged 0.65 units of c.c.s. below mill average and Badila 0.30 units above mill average, representing an average difference of 0.95 units. At Mourilyan the figures were Pindar, 0.38 units below and Badila 1.05 units above—a difference of 1.43 units.

The suggestion has been made that simultaneously the c.c.s. of the older varieties, notably Badila, has fallen. Such a statement is very difficult to prove or refute. Genetically, the capacity of a cane variety to produce sugar should remain constant in a constant environment. But there is no such thing as an unchanging environment, and the behaviour of a cane—in respect of sugar content—is dependent on such variables as rainfall, number of wet days, degree of cloud, temperature, fertilizing, harvesting conditions and many other things.

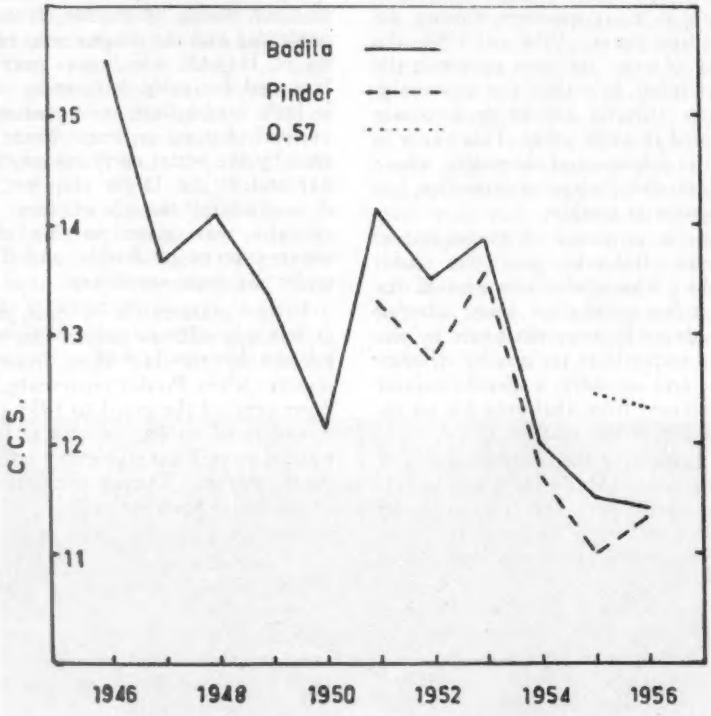

Fig. 18—C.c.s. curves of Badila, Pindar and Q.57.

An attempt was made to ascertain whether the c.c.s. of Badila had changed appreciably over a period of 12 years. To do this seven red soil farms were chosen in the South Johnstone area and their c.c.s. records studied. These farms had grown nothing ex-

cept Badila over the twelve year period and this was the reason for not making the study in Babinda where such conditions did not obtain. The week-by-week c.c.s. returns were collated and averaged and the results are shown in Table I.

TABLE I—Average c.c.s. of Badila on seven South Johnstone red-soil farms from 1945 to 1956

Farm No.	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956
1	14.94	16.12	15.20	14.10	14.34	15.02	15.59	14.58	15.29	13.22	12.46	12.59
2	15.05	16.14	14.80	14.22	14.06	14.55	14.41	13.11	14.39	13.70	12.87	13.86
3	14.63	15.91	14.54	14.25	14.69	13.31	14.92	13.08	15.36	12.13	12.48	13.33
4	11.46	14.49	13.32	14.88	13.19	12.00	13.91	12.82	14.06	13.00	12.41	11.69
5	14.48	16.02	13.74	15.32	13.92	12.72	14.65	14.85	14.44	12.04	13.42	13.85
6	13.79	15.79	13.08	14.52	13.51	12.97	14.66	14.03	15.16	14.32	12.89	13.23
7	14.36	15.17	14.31	15.18	14.98	13.51	15.04	14.58	15.18	12.49	14.07	13.74
Av.	14.10	15.66	14.14	14.64	14.10	13.44	14.74	13.86	14.84	12.99	13.09	13.16

There does not appear to be any close correlation between the annual average c.c.s. of Badila on these farms and the rainfall or wet days. But the average c.c.s. figures do not suggest any downward trend in Badila sugar content. For seven years of the twelve the yearly average is above 14.0; and it was below this figure in 1950, 1952, and the last three seasons. Of the last-mentioned two were very wet and the other a cyclone year.

It is worthy of mention that the new variety Q.57, which constituted 1.04 per cent. of the Babinda crop in 1955 and 6.62 per cent. in 1956 was in those two years 1.39 and 0.86 units of c.c.s. above mill average. Considering its good yielding capacity, its favourable sugar content and its cyclone resistance this variety should be grown to a much larger extent.

Length of Crushing Season

This figure has varied less than is commonly believed, in most mills in the State. Generally speaking, the growth in mill capacity has tended to maintain pace with both the shorter working week and the larger tonnages being grown. Overall, the records for the State's 31 factories show that, from 1946 to 1955, the season has extended very little. For the five years 1946-1950 the crop days per season for all mills aggregated 5,160, while for the following five years the figure was 5,231. On a State basis the above figures represent a 1.4 per cent. increase in seasonal length, but, if recent figures are compared with, say, the 1936-1940 period, the increase is 9.7 per cent. For Babinda alone the average length of season in 1951-55 was 190 days, being 1.07 per cent. above the 1946-50 period and 7.3 per cent. longer than in 1936-40.

Rainfall, Cloudiness, etc.

At the risk of appearing to stress the obvious it is necessary to mention the effects of an abnormally wet year on the sugar content of cane. Babinda has an average annual rainfall of 162.5 inches and it has varied between 109.1 (1951) and 225.5 (1950) inches during the past eleven years. The wettest year in this period was 1950 and it was a low c.c.s. year (mill average 12.13), but total rainfall is only part of the story. The number of wet days, their distribution in the various months, and the incidence and intensity of the accompanying cloud are important factors.

Attempts were made to correlate the c.c.s. with rainfall in various combinations of months which might be critical to sugar content in cane, but without any marked degree of success. Cloud intensity figures are not re-

corded at Babinda Post Office and this discovery was disappointing since there is some reason to believe that photosynthesis and sugar storage in the crop are related to the amount of radiant energy available during the growing and maturing period.

Correlations with the number of wet days in various combinations of months gave a promising lead and Fig. 19 shows c.c.s. plotted against total wet days in April to July over the period 1946 to 1955. It will be noted that the least degree of correlation is shown in the years 1950 and 1955 and it is apparent that wet days, *per se*, for the period April to July are not a measure of the degree of radiant energy. It would be remarkable if a good correlation were obtained since a day on which one point of rain falls is recorded as a wet day and many of the falls might occur at night with clear, sunny days.

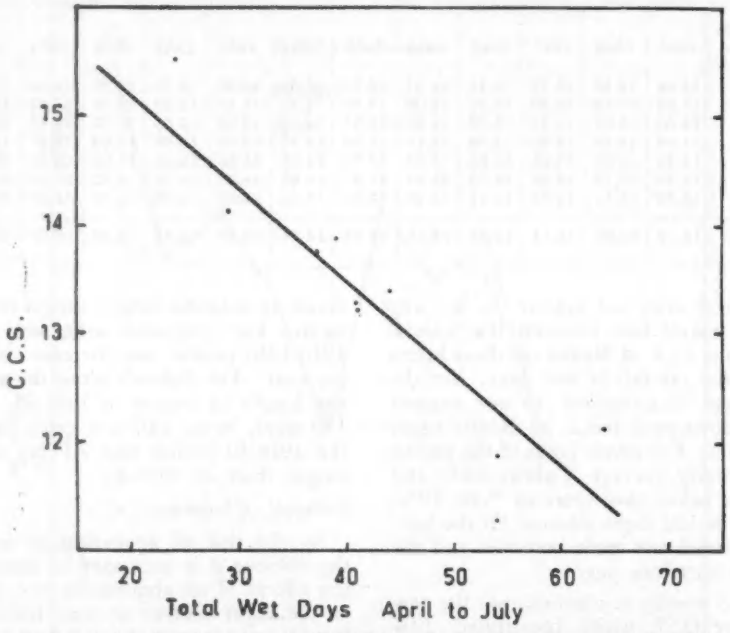

Fig. 19—The number of wet days (April to July) in each year shows some correlation with seasonal c.c.s.

An interesting piece of research recently conducted in Hawaii illustrates the contribution which sunlight makes to cane growth. In this work the soil temperature was kept constant at 72°F. while the air temperature was varied between 50° and 70°F. Under these conditions cane was grown in full sunlight and in half shade (i.e., half the sunlight was excluded by adjustable shutters). The graph in Fig. 20, reproduced with acknowledgment to the H.S.P.A., shows that cane growth was reduced to a remarkable degree by shading—particularly at the higher air temperature. There is no doubt that the excessive cloud cover in the Babinda area is responsible for a lower tonnage per acre than might be expected from the moisture and temperature conditions of the district. Research on such a matter is essential in this country, as is also the effect of the same phenomenon on sugar storage in the crop.

A further study in Hawaii involved cane growing in identical soil at two different locations, one of which was sunny with few rainy days and the other characterised by many wet days and less than half the sunlight. The resultant crops showed that the cane in the sunny climate had nearly three

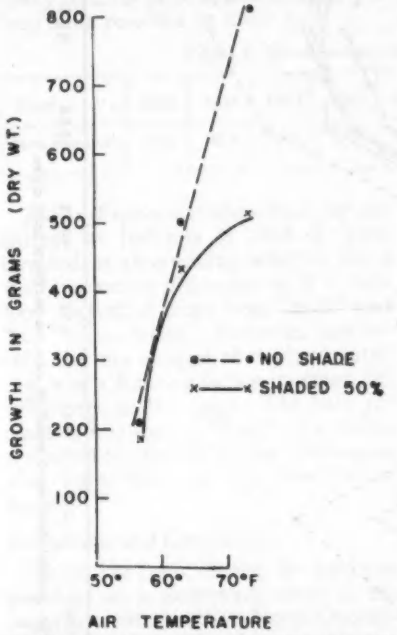

Fig. 20—Effect of air temperature on growth, with and without shade, root temperature 72° F.

times the weight of cane, nearly five times the weight of sugar, and 28 per cent. higher sugar content.

Cane Deterioration after Burning

This factor has received a small amount of attention in Queensland but our knowledge of its effects under a range of climatic conditions is not extensive. A paper to be presented to this conference by A. G. Barrie describes preliminary studies made at Meringa during 1956 and an interesting point disclosed is the relatively high resistance to post-harvesting deterioration exhibited by Badila. The experiment did not include Pindar so no comparisons can be drawn, but the subject of post-harvest deterioration is worthy of study in Babinda because of the conditions of cane harvesting and transport in a very wet area. In Babinda, and in other wet areas where showery weather is commonplace throughout the crushing season, growers are prone to overburn on dry days to ensure continuity of cane supply. This overburning results in cane becoming progressively more stale before it reaches the mill.

The introduction of the 40-hour week tended to accentuate the stale cane and deterioration problem and it is a noticeable factor at Babinda mill that the sugar content of cane on Mondays is lower than that for the other days of the week.

Mechanical Loading

One of the results of this fast-growing practice is the delivery to the mill of varying quantities of soil with the cane. Fine soil particles which stay suspended in the juice for extended periods, can inflate the brix reading and lead to low c.c.s. determinations. It is debateable whether other forms of extraneous matter such as trash and tops have any effect on the quality of first mill roller juices.

Fertilizer Usage

The average cane yields for the Babinda area over the past 10 or so years, shown in Table II, do not indicate any upward trend in unit production which could be attributed to varietal changes or to increased fertilizer usage.

It is necessary to ignore the 1945 figure when war-time labour and fertilizer shortages were still being felt, and the low figures for 1946 and 1951 were the result of drought years. For the remainder, the tonnage per acre has fluctuated between 22.1 and 26.5 with no suggestion of any movement upwards.

This does not infer that there has not been an increase in fertilizer usage.

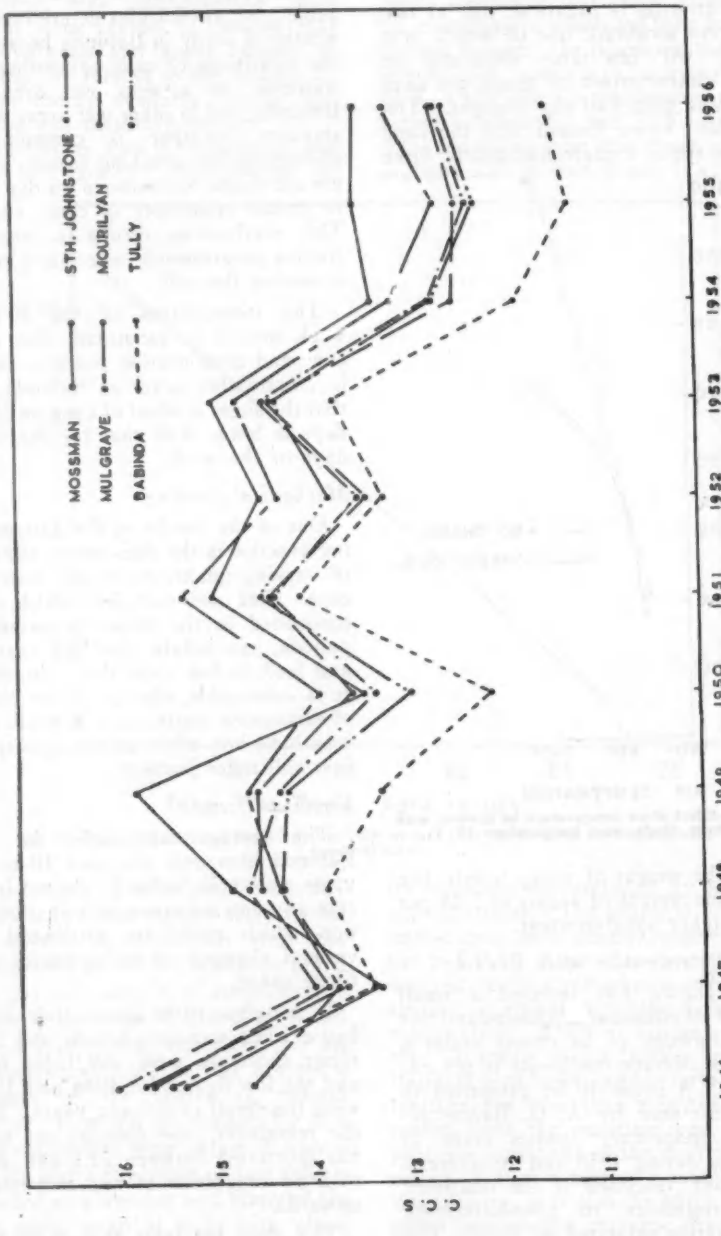

Fig. 21—The general downward trend of c.c.s. in northern mill areas.

It has been established by research in various countries that there is little to be gained from increased fertilization under low sunlight conditions, such as are found at Babinda. If there had been, for example, an increase in the use of sulphate of ammonia per acre it would not have been reflected appreciably in crop growth and it might, in fact, have resulted in lower c.c.s.

It is probable that in very wet years, such as 1950, 1954 and 1955, the average c.c.s. for the area will always move downwards, but it is equally probable that the general position can be improved by attention to some of the responsible factors. Recommended practices would be—

(1) Considerable extension of plantings of Badila, Q.57 and Q.59 with a view to making them major varieties for the district.

(2) The investigation of a simple method of cane washing in the carrier to remove adhering soil. Mechanical loading is likely to increase and means must be found to prevent soil entering the juice.

(3) A campaign to control over-burning; this would be aimed at reducing deterioration between farm and factory.

TABLE II—Average cane yields in Babinda area

Year ..	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955
Cane per acre	18.4	16.3	24.2	22.1	23.3	23.7	17.8	24.3	23.8	26.5	23.2

Foliar diagnosis studies made by the Bureau at Babinda in 1952-53 were directed at ascertaining whether there was any major difference in the plant food content of crops from "high" and "low" c.c.s. farms. However, the results did not suggest that plant nutrition was a limiting factor in sugar development in the crop. The only indication was that on "high" c.c.s. farms the nitrogen content of the cane leaves was lower than on the "low" c.c.s. farms.

Discussion and Conclusions

There has been, during the past ten years or so, a downward trend in the sugar content of cane in North Queensland, as measured by the c.c.s. of cane deliveries (Fig. 21) emphasis was placed on this trend by the "wet" years of 1954 and 1955 and the cyclone effects in 1956.

Babinda has been, outstandingly, the lowest c.c.s. district and the reasons for this are considered to be related to (a) changes in cane variety, (b) climatic conditions in that region (c) cane deterioration between burning and crushing and (d) the effects of mechanical loading.

The climatic conditions of the district are not controllable, but investigations can be made to ascertain to what extent lack of sunlight is affecting the growth and sugar content of the cane. The existing seedling substation at Bartle Frere will provide for selection of high-sugar canes under the prevailing low sunlight conditions.

Cane deterioration studies at Babinda would provide a measure of the sugar losses being caused by the present over-burning practices.

What to Plant?

By E. A. PEMBROKE

As the 1957 planting season approaches, growers will no doubt be seriously considering which varieties would be most suitable for their particular soil types. The choice will be rendered more difficult since the oft repeated caution of the Bureau that "it is unwise to grow too large an area of any one variety" has been emphasised by the advent of cyclone "Agnes" last year and the serious damage occasioned to the variety Pindar in that blow.

Pindar is the most popular variety of North Queensland and the one which was most seriously affected by the cyclone. It is true that even after the damage it sustained many growers felt satisfied with crops of this variety harvested and the c.c.s. figures obtained. Although the final returns were much better than expected, it is still an inescapable fact that yields should have been much heavier and that serious losses in this variety were general. Growers in the Redlynch area can attest to some loss from Pindar almost every year, due to wind damage, whilst in mid-February of this year a freak storm caused an estimated 100 tons loss to one farm in the Mulgrave area and a number of other farms were affected to a lesser degree. The Pindar in this case was not very advanced and the broken cane is unharvestable.

In view of these facts the question "what to plant?" will be more insistent than ever during 1957, especially since most growers will want to restrict acreages of Pindar and these acres must be planted to some other variety.

The various features of the older varieties are well known, but in many cases little is known of the newer "Q" canes, and the following notes are presented chiefly for the benefit of the growers in the four northern mill areas to help them in the selection of varieties for planting this year.

Q.57 is suited to the better class lands where Pindar, Trojan or Badila are grown. It stands up better than Pindar or Badila but will lodge on very rich alluvial country. On ground of below average fertility, although a satisfactory plant crop will be obtained, the ratoons thin down in stalk diameter and this type of country is not capable of maintaining well stooled ratoon crops. The variety dislikes dry patches in blocks and shows them up very readily. It is a good germinator when handled carefully but, especially when plant cane is used, the eyes knock off readily and rough treatment invariably results in disappointing germination. Ratoons make hardier plants as the eyes do not knock off so readily. Because of this weakness the variety lends itself to the "stick in the drill" planting method which is used extensively in Babinda.

Generally the cane can be classed as a good ratooner though individual cases of poor ratoons have been encountered. Q.57 frequently lodged during the pre-harvest burn but some growers, after experimenting with time of burning, have managed to control this to some degree.

The variety is an early to mid-season maturer which arrows very sparsely and in some years, not at all. Because of this it often makes excellent winter growth. From late October on it suckers heavily, particularly on rich soil types.

Q.59 has found its place on the heavy clay loams and granite gravel soils. Its popularity was enhanced in 1956 because it withstood the cyclone conditions better than any other variety—an honour which it shared with Q.57. As a consequence of this it has been planted on the higher, drier soil, particularly in the Hambledon area. In many cases these dry soil plantings have been made as a plant source for 1957. Growers are advised

to be cautious in planting large areas of this variety on these soil types as, though a good looking plant crop will be produced, the indications are that, from past experience, tonnages cut may be disappointing. On the other hand, the variety will die out if subjected to badly waterlogged conditions for lengthy periods.

Q.59 is a similar type of cane to Q.44 but is a better germinator under a given set of conditions. It handles well for plants and makes good early growth, and when planted by August, stools out well. In 1956, particularly in late planted cane, stooling has been light. On the better class lands it grows vigorously and will lodge. On its soil type the variety stands up well and lodging during the pre-harvest burn has not been unduly troublesome. For the past two years in Babinda c.c.s. figures have been particularly good. In other areas c.c.s. figures have been satisfactory though some low figures were encountered by individual growers. It is also an early to mid-season maturer but holds its sugar better later in the season than Q.57 or Pindar. The variety seldom arrows.

Excellent ratoons of Q.59 are a feature, but on two or three occasions in Mossman gappy ratoons have resulted from cane cut for the mlll.

Q.64 is a newer variety which many growers have only had on their farms for the first time in 1956. It is a noble cane of the short, thick-sticked type which requires better class soil for growth. It also shows promise as a replacement for Clark's Seedling on the granite gravel soils of Babinda.

This variety is an excellent germinator, generally slower than Badila or Pindar but faster than Trojan, and germination is very even with strong shoots. Early cover is good and stooling medium on good land, but can be disappointing on dryish soil. The variety weighs very well whilst the sticks are more brittle than Badila—in this respect it resembles Pompey, its other parent. It is an early to mid-season maturer depending upon the quality of land upon which it is grown. It holds its sugar later into the season and is a particularly sound cane, not being subject to internal rots. The variety ratoons well though on occasions these ratoons can be slow growing. It does not arrow and is capable of making good winter growth. It should do particularly well on soil where Pindar lodges and Badila tonnages are somewhat light. Rats show a preference for this cane.

Q.66 (I.233) has come into prominence because of its outstanding ability to remain erect on land where all other varieties lodge readily. It also possesses many other excellent agricultural qualities, being a fast and excellent germinator which stools very well. Early cover is very good, a feature which results in good weed control on rich alluvial soil. The stalks are about as thick as Pindar at the base but taper off to the top similar to Eros, but unlike this variety it does not arrow. Its c.c.s. is not exceptionally high but has remained close to mill average at all times during the year when lodged canes beside it have been very low. Also, in consequence of lodging, these other varieties have attracted a much higher cutting rate and general harvesting costs. It is a fact that what c.c.s. Q.66 may lack at the mill it will make up in reduced harvesting costs and worries. It does not arrow and is capable of good winter growth, whilst rats have shown a decided preference for this variety.

The ratooning ability of this cane has been in doubt for some time, but on its performance last year it has showed up as a fairly good ratooner though it can be very slow at times. On one farm in Mossman a 20 per cent. ratoon gradually improved over a period of about three months until a well stooled 85 per cent. stand was obtained.

Q.66 is highly susceptible to chlorotic streak, leaf scald and ratoon

stunting diseases. Because of these susceptibilities the source of plants must be watched very carefully. Growers are strongly advised to maintain clean stocks of this variety on high land for transfer to good land as plants when required. In this way it is possible to treat periodically a relatively small quantity of the variety, and also it would be easier to keep a check on disease in this small area. It has been noted that when a heavy infection of chlorotic streak has been present in this variety very weak stools and gaps have appeared in ratoons and it is possible that this is the cause of the sometimes indifferent ratooning of this variety. If growers wish to continue growing this variety it behoves them to be absolutely scrupulous about the health of the planting material used.

Co.475 was rapidly propagated on a large number of farms in the four northern mill areas last year and has made a marked impression. It performs very well on sandy soils adjacent to beaches as well as on poor waterlogged clay loam soil types and all other average soils. It was bidding fair to be the replacement cane for Q.50.

The variety is a Pindar type cane with a much narrower leaf, and arrows sparsely. Germination is slow and early growth is spindly and unattractive. However, the cane stools very well and once this stage is reached it covers in and grows rapidly to produce an excellent crop. Ratooning is good and vigorous and the cane stands up well under heavy crops. During the cyclone it suffered damage similar to Pindar but not nearly to the same extent. It was a noted feature that decapitated sticks did not germinate whilst undamaged cane from the same stool germinated quite well.

It was anticipated that the variety would go into general distribution in 1957, but owing to its extreme susceptibility to red rot in southern Queensland, and slight incidences of it here last year, propagation has been stopped in the far north until more is learned about the reaction to the disease in this area. Growers having the variety growing on their properties have been advised that it must not be planted in 1957. Other growers who were considering requesting the variety this year are advised that further plantings cannot be permitted at present and they will be advised at a future date of the ultimate fate of this variety.

In the meantime the search goes on and four "Q" canes from the southern areas were introduced into the four mill areas in 1956. Seedlings obtained from using Co.475 as one of the parents are also under investigation and selections from all these canes will be given further trial in an effort to find a suitable cane to replace Q.50 on the poorer soil types.

Apart from the varietal question the other limiting factor in the selection of planting material will be its freedom from the three diseases mentioned in the Proclamations issued recently. Growers are reminded to seriously heed this Proclamation, and where any doubt exists as to the health of their planting material, to contact a Bureau officer or local Pest Board officer well in advance so that their planting material can be certified. In this way delays can be avoided and where it may be necessary to purchase outside supplies, arrangements can be made in a more leisurely fashion thus avoiding adding to the confusion at a time when there are many jobs clamouring for attention with the approach of the harvesting season.

Technologists see Grub Damage

By C. G. HUGHES

The Conferences of the Queensland Society of Sugar Cane Technologists are held annually in the important sugar towns and cities, and usually alternate from one year to the next between southern and northern centres. The Society aims to provide a forum for the industry within the confines of the industry and is proud of the fact that it has never met in the capital city. The host district arranges the off-session entertainment of the delegates and a prominent feature for the members of the agricultural section is a tour of the cane-producing areas. Transport is usually provided by local farmers, who can answer the numerous questions put by their guests. The items of interest seen on the tour vary from district to district and from year to year. They may include such diverse items as a new farm implement, a noxious weed, attempts at soil erosion control, an aeroplane spraying demonstration, a new variety or a new pest or disease. Anything of interest to the practical farmer, the Pest Board Supervisor or the Bureau officer, may be shown. Scenic spots are often included and there may be a meal or refreshments at a well-known local centre. Whatever may be seen though, the aim of the organizers is to keep the interest of the visitors for the whole day and to return them to their hotels in the evening with a feeling that here is a productive cane district and here are items of possible application back home.

Fig. 22—Agricultural delegates to the Q.S.S.C.T. Conference examining severe greyback grub damage on a farm in the South Johnstone area. BHC had not been applied.

The pleasant agricultural tour during the recent Innisfail Q.S.S.C.T. Conference was in the true tradition of its predecessors, but it was unique in one respect. That is that surely never

before have Queensland agriculturists been interested in looking at a field affected by the greyback cane grub. The pest has been so much part and parcel of our industry that conferences in the past have accepted the damaged fields as a matter of course, just as a wet day or a dry spell would be accepted. It is only just eleven years since the first exploratory trial on the Northern Sugar Experiment Station showed that benzene hexachloride was the long awaited solution to the cane grub problem. Commercial trials followed and so rapid was the acceptance of the new idea, and so effective the chemical, that grub damage is now in our minds only a memory of a troublesome past.

It was, therefore, with some eagerness that the Conference delegates poured out of the cars into a field of grub-damaged Badila at South Johnstone. The farmer had been in the middle of his BHC treatment when he had to go to hospital. The treated section showed green and upright cane and an average crop will be harvested. The cane in the area not treated was a distressing contrast. The grubs, moving freely through the friable red volcanic soil, had pruned all the roots and the field presented a depressing picture of fallen, tangled cane and brown, tinder-dry tops. Stools could be pulled from the soil with one hand. There may be something salvaged from the wreck if the cane can be used for plants before it deteriorates, but in any case, the stools are dead and there will be no ratoons.

The sight of this badly damaged field aroused our sympathy for the farmer but it also brought a feeling of thankfulness for the efficacy of benzene hexachloride and for the scientists who made it and worked out the methods for its application.

Poisoning Coots

From time to time farmers are plagued by a flock of coots which settle in a block and commence to destroy large patches of cane. The birds attack the growing point and are often unobserved for several weeks. Shooting is of little value as only one or two are killed and the birds move to another paddock. Two farmers in the Mackay district obtained excellent results from poisoning.

The first step is to clear the headlands in several places and sow cracked corn on the bare ground. The birds are suspicious and will take any time up to several weeks before they will eat any quantity of the grain. Keep replacing the grain as it is eaten and do not poison until the birds are feeding freely.

Directions for making the poison are as follows:—Half an ounce of strychnine is covered with vinegar and left overnight. In the morning, add two cups of sugar to sweeten the mixture. This is then added to one quart of hot water and stirred thoroughly. This mixture is enough to treat a quarter of a kerosine tin of cracked corn.

This treated corn is substituted for the untreated corn and the stricken birds can be seen flying towards water. One grower counted several hundred birds which were killed after the laying of the first bait.

It must be stressed that disappointment will follow if the bait is set out too early.

A.A.M.

Random Gleanings

An item of news recently featured in press and radio concerned the introduction of Commonwealth Government legislation to set up an Australian wheat research fund. Growers will contribute one farthing per bushel per annum and monies used for approved research programmes will receive a Government subsidy of up to 50 per cent. The Commonwealth and State Governments, the growers and University and C.S.I.R.O. experts will be represented on the Council to administer the fund. Sugar producers are used to paying for the research work and the necessary extension services as well, for that policy dates back nearly 60 years in Queensland; nevertheless it is pleasing to note that the wheat industry, the total production of which is worth well over twice as much as sugar, is at last being asked to contribute to at least part of the cost of its own scientific services, which have hitherto been a charge on the general taxpayer.

Oil wells and sugar cane along the Queensland coast may be an unattainable combination but Louisiana, which provides, with a small amount from Florida, all the mainland cane sugar in the U.S.A., is much more fortunate. There it has become a common sight to see the giant oil rigs set up in the middle of cane fields. The machinery involved and the going and coming of heavy haulage equipment makes a mess of the field but once the well is in production, the superstructure is removed, and a few pipes and a small group of pumps and valves are all that remain. The cane is planted again and it is certain that there is not a dissentient voice raised against the temporary invasion. The Louisiana oil production is now said to be higher than the Texas, which surely must be hard to take in some quarters !

The results of a row spacing trial which were reported recently are of interest. The experiment was carried out in British Guiana where the cane rows are usually planted six feet apart. This was compared with a "pineapple row" spacing in which two rows were planted 18 inches apart with an inter-row space of 4 feet 6 inches to the next double row. However, there were no differences in yield either in cane or sugar per acre between the two types of planting. The pineapple rows appeared to produce more shoots in the early stages but the differences had disappeared by the time the cane was slightly over six months old. It was also stated that the pineapple row planting required the use of twice the amount of planting material as compared with the normal six foot inter-row method.

Speaking of spacing, the details of a spacing trial in Pakistan have also been noticed. In this case rows were spaced at different widths, varying from one foot to four feet apart. As might be expected, in the very close rows the number of setts used, by our standards, was astronomical and varied from 25,000 to 50,000 per acre. While the time of the year at which the plantings were made had some effect on the yields from the different methods, generally the two foot spacing gave the highest yields.

A different view point. A Victorian correspondent recently deflated our opinion of the size of our sugar industry. He pointed out that the area cultivated to cane in Queensland is only about the area of Greater Melbourne. Since the latter is claimed to be approximately 1,000 square miles (640,000 acres) it seems that his contention is correct.

The Bureau has spent considerable time of recent years trying to track down the many reasons for fluctuating and low c.c.s. Apparently this subject has also been receiving attention in the British West Indies, where differences in sugar yields occur that do not seem to be related to varieties or soil variations. The age of the cane and weather were found to have very obvious and far-reaching effects on sugar content, but several other factors were also studied. For example, the popular variety B.37161 was not very greatly affected either in sugar or weight by flowering. It was found that sugar decreased rapidly shortly after rain and it was thought that this could be due to stimulation of suckering and root formation. Once a decrease of this kind had commenced it was some four months before the quality of the cane returned to its original level.

Without grower co-operation in affected areas the control of chlorotic streak disease will undoubtedly prove a most difficult problem. It is therefore timely to note that recent trials in Trinidad have shown that this disease decreased the yield of a major cane variety by 28 per cent. The use of infected planting material reduced germination to 75 per cent. of that of clean setts. Bureau officers and Pest Board supervisors are well aware of the insidious nature of this disease and no effort is being spared to acquaint growers of the steps that should be taken to limit its far too frequent outbreaks.

Maple syrup is a well known and commonly used commodity in many parts of Canada and America. It forms the basis of quite a sizeable industry and a feature that would appeal to Queensland cane growers is that maple juice simply runs out of the tree, no squeezing or crushing being required. However, apparently the juice flows more copiously when the temperature of the tree remains at 0.0 degrees Centigrade for a number of hours the day before it is tapped. 0.0 degrees Centigrade is freezing point and indicates that rather cool weather prevails during the harvesting season.

Cane growers will be interested to learn that the search by the Bureau for improved legumes for use in the sugar industry appears to be meeting with some success. Messrs. Roffey Bros., Gaeta View, have at our request produced small seed stocks of two legumes, C.P.I.9247 and C.P.I.12377, and intend to propagate these to the fullest extent this year. It is hoped that ample stocks will be available for general planting in the sugar industry in a year or two. Before they are distributed for general planting they will be given suitable names.

The foundations for aerial spraying in the sugar industry are being gradually laid down. During the past several months urea has been applied to cane in Bundaberg, weedicides have been sprayed on to cane fields in Ingham and Ayr, and more recently Bordeaux mixture has been sprayed experimentally for the control of yellow spot disease. One of the interesting features of the weedicide work is that, although used to kill bell-vine, it was successful in killing small weeds growing among tall cane. Apparently the wind action caused by the propellor blows the tops around so much that the weedicide finds its way down to ground level.

FREE SERVICES TO CANE GROWERS

The Bureau offers the following free services to *all* cane growers in Queensland:—

Soil Analysis and Fertilizer Recommendations

Your soil will be analysed by the most modern methods, and a report will be posted containing a recommendation covering the type of fertilizer required, the amount per acre, the need for lime, and other relevant information. Phone the nearest Bureau office and the soil samples will be taken as soon as possible.

Culture for Green Manure Seed

Cultures and instructions for the inoculation of the seed of cowpeas, velvet beans, mung beans or any other legume will be posted to any cane grower upon request to The Director, Bureau of Sugar Experiment Stations, Brisbane. Allow a week after receipt of your letter for the culture to be prepared and posted, but as the culture will easily keep a month or so it is a good idea to get your culture when you get your seed. If sowing is delayed, ask for another batch of culture; there is no charge.

Advice on All Phases of Cane Growing

The Bureau staff is at the service of all cane growers. They can best advise you on matters pertaining to varieties, fertilizers, diseases, pests, drainage and cultural methods. Bureau officers are available in every major cane growing district. A phone call will ensure a visit to your farm.